Certified Level 1 Validation Report, Part A: Validator Provided Details

Validator Provided

Audit Information:

Water Supplier Name: City of Sierra Madre **PWS ID:** CA1910148

System Type: Potable **Audit Period:** 7/2018 – 6/2019

Utility Representation: Jose Reynoso, Utilities Director Steven McGee, Water Superintendent

Validation Date: 6/23/2021 **Call Time:** 13:00 **Sufficient Supporting Documents Provided:** Yes

Validation Findings & Confirmation Statement:

Key Audit Metrics:

Data Validity Score: **63** **Data Validity Band (Level):** **Band III (51 – 70)**

ILI: **2.97** **Real Loss:** **66.69** (Gal/conn/day) **Apparent Loss:** **45.24** (Gal/conn/day)

Non-revenue water as percent of cost of operating system: **21.6%**

Certification Statement by Validator:

This water loss audit report has been Level 1 validated per the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34.

All recommendations on volume derivation and Data Validity Grades were incorporated into the water audit. ☒

If not, rejected recommendations are included here.

Validator Information:

Water Audit Validator: Justin Bailey, Rubio Cañon Land and Water Association

Qualifications: Water Audit Validator Certificate issued by the CA-NV Section of the AWWA

Certified Level 1 Validation Report, Part B: Utility Provided Details

Utility Provided

Audit Information:

Water Supplier Name:	City of Sierra Madre
Water Supplier ID Number:	CA1910148
Water Audit Period:	7/2018 – 6/2019

Water Audit & Water Loss Improvement Steps:

- Prioritizing completion of City-wide meter change out / upgrade to smart meters & Advanced Metering Infrastructure system.
- Continue water main line replacement projects and aging infrastructure recapitalization.
- Planning transition from Bi-Monthly customer billing to monthly customer billing.

Certification Statement by Utility Executive:

This water loss audit report meets the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34 and has been prepared in accordance with the method adopted by the American Water Works Association, as contained in their manual, *Water Audit and Loss Control Programs, Manual M36, Fourth Edition* and in the Free Water Audit Software version 5.

Executive Name (Print)	Executive Position	Signature	Date
Steven McGee	Water Superintendent	SEMc	7/12/2021

Level 1 Validation Summary Notes

Pre-Interview Notes	The City of Sierra Madre is a full-service municipality located in Los Angeles County, California. Sierra Madre's primary source of water supply is groundwater from the Santa Anita sub-area (or Eastern Unit) of the Raymond Basin. The City provides water to roughly 3,800 active connections over a 3 square mile area and a population of 11,000.

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Volume from Own Sources (VOS)	**Supply meter profile:** (4) wells provided 100% of all water supplied in the Audit period. (4) Boosters then pump this water into the "Main Reservoir". (3) Booster Pumps then draw the water out of the "Main Reservoir" and pump the treated water into the distribution system. **VOS Input Data Source:** Meter registers are read daily and monthly. Production reports track cumulative production throughout the year. **Comments:** 100% of water entering the system was provided by City of Sierra Madre's own sources. The meters for each Booster are not yet tested volumetrically on an annual basis. Confirmed input value: **2,216.006 AF**	**Percent of VOS metered:** 100% metered **Signal calibration frequency:** Unknown **Volumetric testing frequency:** Boosters are not tested volumetrically **Volumetric testing method:** N/A **Percent of VOS tested and/or calibrated:** 0% **Comments:** The volumetric testing for the production wells occurs annually but these wells discharge through various treatment processes and then into a "Main Reservoir" where the water is then lifted by booster pumps into the distribution system. The Booster Pump meters are used for the VOS volume. Confirmed DVG: **5**
VOS Master Meter Error Adjustment	**Adjustment Basis:** N/A **Net Storage Change Included:** No **Comments:** Sierra Madre conducts routine volumetric meter accuracy testing of their (4) production wells annually – but no testing is performed on the Booster Pumps that lift the Well water into the distribution system. Unknown meter accuracy of the Booster Pumps prevents the well production volumes from remaining consistent as it is redistributed into the distribution system. Confirmed input value: **0.0 AF**	**Supply meter read frequency:** Daily **Supply meter read method:** Manual Read only **Frequency of data review:** Monthly **Storage level monitoring frequency:** Weekly **Comments:** Known meter accuracy % is applied to each recorded monthly registered volume to produce highly accurate actual volumes produced Confirmed DVG: **N/A**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Water Imported (WI)	**Import meter profile:** Unknown **WI Data Source:** Unknown **Comments: No water was imported through any connections during this audit period.** **Confirmed input value: 0.0 AF**	**Percent of WI metered:** Unknown **Signal calibration frequency:** Unknown **Volumetric testing frequency:** Unknown **Volumetric testing method:** Unknown **Percent of WI tested and/or calibrated:** Unknown **Comments:** None **Confirmed DVG: N/A**
WI Master Meter Error Adjustment	**Adjustment Basis:** N/A **Comments:** **Confirmed input value: N/A**	**Import meter read frequency:** **Import meter read method:** **Frequency of data review:** **Comments:** Left blank for lack of test data **Confirmed DVG: N/A**
Water Exported (WE)	**Export meter profile:** N/A **WE Data Source:** N/A **Comments:** N/A **Confirmed input value: 0.0 AF**	**Percent of WE metered:** N/A **Signal calibration frequency:** N/A **Volumetric testing frequency:** N/A **Volumetric testing method:** N/A **Percent of WE tested and/or calibrated:** N/A **Comments:** N/A **Confirmed DVG: N/A**
WE Master Meter Error Adjustment	**Adjustment Basis: N/A** **Comments:** Left blank for lack of test data **Confirmed input value: N/A**	**Export meter read frequency:** N/A **Export meter read method:** N/A **Frequency of data review:** N/A **Comments:** None **Confirmed DVG: N/A**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Billed Metered Authorized Consumption (BMAC)	**Customer Meters & Reads Profile:** The customer base is comprised of a mix of service types; 94.6% Residential, 3% commercial businesses, 1.5% Institutional, & 1.0% City / Fire service connections. Total Service count during the FY averaged 3,678 between odd and even month billing cycles. 3,788 reported as of end of FY. - **Age profile:** 50% of meters are 10 years old or newer. 25% of meter population has either been replaced with new meter & register, or had an upgraded digital register added within the last 2 years. - **Reading system:** manual meter reads entered into computerized billing software - **Read frequency:** Monthly **Billing Data Pro-rated?** Yes, in the event of meter failure. Historical billing data is utilized to estimate billing amount. **Comments:** Includes all metered water sales of 1,699.955 AF Confirmed input value: **1,699.955 AF**	**Percent of customers metered:** 100% **Small meter testing policy:** Proactive meter testing was last performed in FY17/18, although at low quantity. **Number of small meters testing/year:** No customer meter testing in FY18/19 **Large meter testing policy:** Reactive meter testing based on customer requests or complaints **Number of large meter tested/year:** None **Meter replacement policy:** Yes. Meter replacement is performed annually. Policy was revised in 2018 and remained on track to replace > 400 meters per year to achieve full AMI deployment. The full transition to AMI metering was completed in FY19/20. **Number of replacements/year:** Reported total is 627 complete meter replacements (16.55%) of total meter population in FY 18/19. **Billing data auditing practice:** Automated billing software w/ monthly in-house auditing and annual 3rd party auditing **Comments:** Significant improvement in ability to record and retrieve customer meter data. Confirmed DVG: **5**
Billed Unmetered Authorized Consumption (BUAC)	**Billed Unmetered Profile:** None Reported **Input Derivation:** **Comments:** No Estimated billing Confirmed input value: **0.0 AF**	**Policy for metering exemptions:** Strict policy for approval and invoicing are in place. **Comments:** Confirmed DVG: **N/A**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Unbilled Metered Authorized Consumption (UMAC)	**Unbilled Metered Profile:** Hydrant or temporary meters used to accurately record Blow-Off flushing and reservoir dewatering + Well shaft seal lube lines. **Input Derivation:** Monthly Billing Summary + Operational details of recorded lubrication line flows to the City's Wells. Registered volumes are recorded on a monthly basis to tabulate a running current total. **Comments:** Most hydrant flushing is performed with a flushing truck equipped with flow meters. **Confirmed input value: 35.565 AF**	**Policy for billing exemptions:** Strict policy for approval and invoicing are in place to limit unbilled conditions. **Comments:** Records are kept updated and available for 3rd party review. **Confirmed DVG: 8**
Unbilled Unmetered Authorized Consumption (UUAC)	**Unbilled Unmetered Profile:** Operational flushing and fire department use. **Input Derivation if Estimated:** Records of Flushing volumes & frequency based on estimates **Comments:** Default of 0.25% x WS utilized due to reduced quantity and duration of operational discharges. **Confirmed input value: 5.540 AF**	**Default or Adjusted Default Applied:** Default input utilized **Completeness of Documentation:** Records kept of estimated frequency and volumes **Comments:** All fire flow volumes and hydrant flushing are monitored and calculated by time and flow formulae to minimize UUAC volumes. **Confirmed DVG: 5**
Unauthorized Consumption (UC)	**Default Applied?** Yes **Input Derivation if Customized:** Default input utilized **Comments:** All suspicious activities are investigated and active efforts are built into routine patrols to guard against UC. **Confirmed input value: 5.540 AF**	**Instances and extent of UC documented:** None identified. **Comments:** Sierra Madre has policies and practices in place to actively identify instances of UC. However, since known instances occur so infrequently, no auditable documentation has been put in place to track and query each instance. Small (3 Sq. Miles) service area benefits internal efforts to monitor for UC activities. **Confirmed DVG: 5**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Customer Metering Inaccuracies (CMI)	**Input Derivation:** See BMAC activities for meter replacement practices. Meter accuracy estimated on limited test results (<1% of meter population in 17/18) and significant meter replacements with AMR / AMI technology. **Comments:** Considerable improvement in overall accuracy can be estimated due to the quantity of meters replaced per year for multiple consecutive years. Not only is this an extensive replacement of aged and inaccurate meters, but the integration of advanced monitoring and recording capability at the individual meter, contributing to the overall capacity to maintain accuracy. Confirmed input value: **9.5% Input Applied – 182.182 AF**	**Characterization of meter testing:** Limited meter testing was conducted in FY17/18 (Previous Audit Year). This testing did cover a wide range of size and age meters. This baseline provides a consistent backdrop to apply improved accuracy estimates to the overall meter population. Especially with more than 1,000 meters being fully replaced since CY2017. Testing + significant replacement allows for greater confidence in meter accuracy improvement. **Characterization of meter replacement:** Replacement Policy revised in 2018 to increase from roughly 50 per year to over 400 per year. 627 meters replaced in FY 18/19. **Comments:** Meters tested last year resulted in a 13.5% level of inaccuracy. Validator is estimating roughly 4% improvement in overall accuracy per year as > 400 meters were replaced per year. This would set a trajectory of a total system inaccuracy of 1%-2% once the entire system is made up of relatively new, high performance meters, and they have been in operation for the entire Audit Period. Since this Validation is being done retro-actively (June, 2021) it has been confirmed that the replacement trajectory plotted during this FY (18/19) Audit Period is going to be completed as of July, 2021. Confirmed DVG: **6**
Systematic Data Handling Errors (SDHE)	**Input Derivation:** Computerized billing software and reporting is in place. In house audits of data occur monthly and a 3rd party auditor review takes place annually. **Comments:** Account management practices are reviewed annually by staff. Software automatically flags for zero, hi, and low usage. Reports and billing are processed monthly and internal audits of data are performed monthly. 3rd party audits are currently taking place every 3 years. Confirmed input value: **4.250 AF**	**If custom estimate provided –** Default input utilized **Characterization of read collection & billing process:** Automated collection with computerized billing software **Characterization of billing process and billing data auditing:** In house monthly and 3rd party annually. Confirmed DVG: **5**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Length of Mains	**Input Derivation:** Historic data of pipeline installations, As-Builts, GIS database. **Hydrant lateral length included:** No **Comments:** City of Sierra Madre operates a GIS asset management software and a recently updated hydraulic model in project planning and oversight **Confirmed input value: 47.6 Miles**	**Mapping format:** GIS, paper maps, and Hydraulic Model **Asset management database:** Yes **Map updates & field validation:** Map updates take place following each project and are a combination of edits both in-house and outsourced engineering consultant **Comments:** IDModeling completed Hydraulic Model in 2017. **Confirmed DVG: 8**
Number of Active and Inactive Service Connections	**Input Derivation:** Billing software is used to query accurate record of accounts. **Basis for database query:** Account ID or service size **Comments:** Service area is effectively 'built out' with only small quantities of account activations or deactivations occurring annually. Reported totals are 3,788 active meters as of June 30, 2019 and tabulated totals (Monthly billing) total 3,704 active meters. Calculated variance between meter count is within 2.9%. BMAC quantity used FY18/19 final count of 3,788. **Confirmed input value: 3,788**	**CIS updates & field validation:** Accomplished through normal meter reading process **Estimated error of total count within:** Within 3% **Comments:** Infrequency of Account activation or deactivation combined with computerized accounting software produces highly consistent total service qty. Auditing of electronic records takes place by a 3rd party annually. **Confirmed DVG: 7**
Average Length of Customer Service Line	**Are customer meters at the curbstop?** Yes **Where are customer meters installed if not at curbstop? N/A** **Customer service line derivation** **Comments:** Default input grade applied. Customer meters are typically located at the property boundary. **Confirmed input value: YES**	**Comments:** Default input grade applied. Customer meters are typically located at the property boundary. **Confirmed DVG: 10**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Average Operating Pressure	**Number of zones, general setup:** The City has 3 Pressure zones and 2 sub-zones within 2 of the pressure zones. The system pressures are maintained by gravity. **Typical pressure range:** 20 – 200 psi in general w/ 103 psi average across all pressure zones. **Input derivation:** SCADA telemetry, facility elevations **Comments:** The hydraulic model was created for the City of Sierra Madre in 2017. Confirmed input value: **103.0 psi**	**Extent of static pressure data collection:** SCADA records basic system pressures while pumps and wells are on or off, allowing static and dynamic pressures to be identified. **Characterization of real-time pressure data collection:** SCADA telemetry does not actively record distribution system pressures **Hydraulic model in place?** Yes **Calibrated?:** 2017 **Comments:** Pressure zone integrity is tightly monitored and no valves are left in a position to breech pressure zones. However, telemetry does not capture system pressures throughout the system, beyond pump station and reservoirs, and hydrant data loggers are not consistently used and factored into modeled pressure. Confirmed DVG: **5**
Total Operating Cost (TOC)	**Input Derivation:** Tabulated summation of all categorical expenses as provided by COSM. Each applicable cost was compiled into a spreadsheet to determine a highly accurate – and quantifiable breakdown of all Water System related costs. **Comments:** Comprehensive Annual Financial Report - City of Sierra Madre, California - Village of the Foothills - Statement of Revenues, Expenses and Changes in Net Position - For the Year Ending June 30, 2019 Statement of Revenues, Expenses and Changes in Net Position For the years ended June 30, 2019 and 2020 From City of Sierra Madre Annual Financial Report identifies the Total Water System Expense as $4,083,000 for FY18/19. However, this value cannot be substantiated by actual itemized cost breakdown – as per information provided by COSM Staff. Itemized cost breakdown of $3,825,484.00 used due to higher fidelity in true cost incorporation and verifiability. Confirmed input value: **$3,825,484 / Year**	**Frequency of internal auditing:** Confirmed as twice per year by COSM Staff. **Frequency of third-party CPA auditing:** Annually **Comments:** Well-structured cost accounting system is in place with internal review taking place monthly, and 3rd party audit of data occurring annually. Confirmed DVG: **10**

Level 1 Validation Summary Notes

Audit Input	Confirmation of Input Derivation	Confirmation of DVG Assignment
Customer Retail Unit Cost (CRUC)	**Input Derivation:** *Comprehensive Annual Financial Report - For the Fiscal Year Ended June 30, 2019* – Page 30 overall - Comprehensive Annual Financial Report - City of Sierra Madre, California - Village of the Foothills - For the Year Ending June 30, 2018 and 2019 – Statement of Revenues, Expenses and Changes in Net Position For the years ended June 30, 2019 – Table 5 on Page 12 **Sewer Charges Volumetric?** N/A **Sewer Charges Included?** N/A **Comments:** BMAC + BUUC = 1,705.495 AF. Divided into Sales Revenue of $5,668,000 Confirmed input value: **$7.63 / 100 Cubic Feet**	**Characterization of calculation:** Calculation of volumetric charges divided by metered consumption. Input calculations have not been reviewed by an M36 water loss expert. **Comments:** Tiered rate structure reviewed and updated costs implemented 7/2018 Confirmed DVG: **9**
Variable Production Cost (VPC)	**Supply profile:** 100% of water supplied was produced by City of Sierra Madre own sources in FY 2018/2019. **Direct variable costs included:** Power and treatment related costs divided by Water Supplied. **Secondary costs included:** Pumping, Transmission & Distribution, Depreciation. **Comments:** Itemized cost breakdown of $1,291,931.00 used due to higher fidelity in true cost incorporation and verifiability further itemized to identify costs directly related to water supplied per unit. Confirmed input value: **$583.00 / AF**	**Characterization of calculation:** Accounting GL CSV files used to tabulate most itemized Direct and Secondary costs. Annual reports used to identify remaining total cost figures. **Comments:** Although primary and secondary costs are well known and tracked, the input calculations do not yet include depreciation costs and are not reviewed by an M36 water loss expert. Confirmed DVG: **7**
Pending Items needed to complete the validation	None	